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October 11, 2021

Illinois Power Resources Generating, LLC
17751 North Cilco Road
Canton, Illinois 61520

Subject: USEPA CCR Rule and IEPA Part 845 Rule Applicability Cross-Reference
2021 USEPA CCR Rule Periodic Certification Report
GMF Pond, Duck Creek Power Plant, Canton, Illinois

At the request of Illinois Power Resources Generating, LLC (IPRG), Geosyntec Consultants (Geosyntec) has prepared this letter to document how the attached 2021 United States Environmental Protection Agency (USEPA) CCR Rule Periodic Certification Report (Report) was prepared in accordance with both the Federal USEPA CCR Rule[1] and the state-specific Illinois Environmental Protection Agency (IEPA) Part 845 Rule[2]. Specific sections of the report and the applicable sections of the USEPA CCR Rule and Illinois Part 845 Rule are cross-referenced in **Table 1**. A certification from a Qualified Professional Engineer for each of the CCR Rule sections listed in **Table 1** is provided in Section 9 of the attached Report. This certification statement is also applicable to each section of the Part 845 Rule listed in **Table 1.**

Table 1 – USEPA CCR Rule and Illinois Part 845 Rule Cross-Reference

Report Section	USEPA CCR Rule		Illinois Part 845 Rule	
3	§257.73 (a)(2)	Hazard Potential Classification	845.440	Hazard Potential Classification Assessment[3]
4	§257.73 (c)(1)	History of Construction	845.220(a)	Design and Construction Plans (Construction History)
5	§257.73 (d)(1)	Structural Stability Assessment	845.450 (a) and (c)	Structural Stability Assessment
6	§257.73 (e)(1)	Safety Factor Assessment	845.460 (a-b)	Safety Factor Assessment
7	§257.82 (a)(1-3)	Adequacy of Inflow Design Control System Plan	845.510(a), (c)(1), (c)(3)	Hydrologic and Hydraulic Capacity Requirements / Inflow Design Flood Control System Plan
	§257.82 (b)	Discharge from CCR Unit	845.510(b)	Discharge from CCR Surface Impoundment

[1] United Stated Environmental Protection Agency, 2015. *40 CFR Parts 257 and 261, Hazardous and Solid Waste Management System, Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule.*
[2] State of Illinois, Joint Committee on Administrative Rule, Administrative Code (2021). *Title 35: Environmental Protection, Subtitle G: Waste Disposal, Chapter I: Pollution Control Board, Subchapter j: Coal Combustion Waste Surface Impoundment, Part 845 Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments.*
[3] "Significant" and "High" hazard, per the CCR Rule[1], are equivalent to Class II and Class I hazard potential, respectively, per Part 845[2].

CLOSING

This letter has been prepared to demonstrate that the content and Qualified Professional Engineer Certification of the 2021 Periodic USEPA CCR Rule Certification Report fulfills the corresponding requirements of Part 845 of Illinois Administrative Code listed in **Table 1**.

Sincerely,

Lucas P. Carr, P.E.
Senior Engineer

John Seymour, P.E.
Senior Principal

2021 USEPA CCR RULE PERIODIC CERTIFICATION REPORT §257.73(a)(2), (c), (d), (e) and §257.82 GMF POND Duck Creek Power Plant Fulton County, Illinois

Submitted to

Illinois Power Resources Generating, LLC

17751 North Cilco Road
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Submitted by

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF DRAWINGS

LIST OF ATTACHMENTS

EXECUTIVE SUMMARY

This Periodic United States Environmental Protection Agency (USEPA) Coal Combustion Residuals (CCR) Rule [1] certification report (Periodic Certification Report) for the GMF Pond[1] at the Duck Creek Power Plant (DCPP) has been prepared in accordance with Rule 40, Code of Federal Regulations (CFR) §257. herein referred to as the "CCR Rule" [1]. The CCR Rule requires that initial certifications for existing CCR surface impoundment, completed in 2016 and subsequently posted on the Illinois Power Resources Generating, LLC (IPRG) CCR Website ([2], [3], [4], [5], [6]) be updated on a five-year basis.

The initial certification reports developed in 2016 and 2017 ([2], [7], [3], [4], [5], [6], [8]) were independently reviewed by Geosyntec. Additionally, field observations, interviews with plant staff, and evaluations were performed to compare conditions in 2021 at the GMF Pond relative to the 2016 initial certifications. These tasks determined that updates are not required for the Initial Hazard Potential Classification or Inflow Design Flood Control Plan. However, due to changes at the site and technical review comments, updates were required and were performed for the:

- History of Construction Report,
- Initial Structural Stability Assessment, and
- Initial Safety Factor Assessment.

Geosyntec's evaluations of the initial certification reports and updated engineering evaluations determined that the GMF Pond meets all requirements for hazard potential classification, history of construction reporting, structural stability assessment, safety factor assessment, and hydrologic and hydraulic control. **Table 1** provides a summary of the initial 2016 certifications and the updated 2021 periodic certifications.

[1] The GMF Pond is also referred to as ID Number W05780100001-04, GMF Pond by the Illinois Environmental Protection Agency (IEPA); CCR unit ID 203 by IPRG, and IL50573 within the National Inventory of Dams (NID) maintained by the Illinois Department of Natural Resources (IDNR). Within this document it is referred to as the GMF Pond or the GMFP.

Table 1 – Periodic Certification Summary

	CCR Rule Reference	Requirement Summary	2016 Initial Certification		2021 Periodic Certification	
			Requirement Met?	Comments	Requirement Met?	Comments
Hazard Potential Classification						
3	§257.73(a)(2)	Document hazard potential classification	Yes	Impoundment was determined to have Significant hazard potential classification [2].	Yes	Updates were not determined to be necessary. Geosyntec recommends retaining the Significant hazard potential classification.
History of Construction						
4	§257.73(c)(1)	Compile a history of construction	Yes	A history of Construction report was prepared for the GMF Pond [3].	Yes	The Duck Creek Power Plant closed and CCR materials are no longer being placed in the GMF Pond. A letter listing updates to the History of Construction report is provided in **Attachment C.**
Structural Stability Assessment						
5	§257.73(d)(1)(i)	Stable foundations and abutments	Yes	Foundations and abutments were found to be stable [8].	Yes	Foundations and abutments were found to be stable after performing updated slope stability analyses.
	§257.73(d)(1)(ii)	Adequate slope protection	Yes	Slope protection was adequate [8].	Yes	No changes were identified that may affect this requirement.
	§257.73(d)(1)(iii)	Sufficiency of dike compaction	Yes	Dike compaction was sufficient for expected ranges in loading conditions [8].	Yes	Dike compaction found to be sufficient after performing updated slope stability analyses.
	§257.73(d)(1)(iv)	Presence and condition of slope vegetation	Yes	Vegetation was present on exterior slopes and is maintained. Interior slopes had alternate protection (geomembrane liner) [8].	Yes	No changes were identified that may affect this requirement.
	§257.73(d)(1)(v)(A) and (B)	Adequacy of spillway design and management	Yes	Spillways were adequately designed and constructed and were expected to adequately manage flow during 1,000-year flood [8].	Yes	No changes were identified that may affect this requirement.
	§257.73(d)(1)(vi)	Structural integrity of hydraulic structures	Not Applicable	Hydraulic structures penetrating the dikes or underlying the base of the GMF Pond were not present [8].	Not Applicable	No changes were identified that may affect this requirement.
	§257.73(d)(1)(vii)	Stability of downstream slopes inundated by water body.	Not Applicable	Inundation of exterior slopes was not expected; this requirement was not applicable [8].	Not Applicable	No changes were identified that may affect this requirement.
Safety Factor Assessment						
6	§257.73(e)(1)(i)	Maximum storage pool safety factor must be at least 1.50	Yes	Safety factors were calculated to be 4.27 and higher [8].	Yes	Safety factors from an updated slope stability analyses were calculated to be 3.47 and higher.
	§257.73(e)(1)(ii)	Maximum surcharge pool safety factor must be at least 1.40	Yes	Safety factors were calculated to be 4.26 and higher [8].	Yes	Safety factors from an updated slope stability analyses were calculated to be 3.47 and higher.
	§257.73(e)(1)(iii)	Seismic safety factor must be at least 1.00	Yes	Safety factors were calculated to be 2.37 and higher [8].	Yes	Safety factors from an updated slope stability analyses were calculated to be 1.88 and higher.
	§257.73(e)(1)(iv)	For dike construction of soils that have susceptible to liquefaction, safety factor must be at least 1.20	Not Applicable	Dike soils were not susceptible to liquefaction [8].	Not Applicable	No changes were identified that may affect this requirement.
Inflow Design Flood Control System Plan						
7	§257.82(a)(1), (2), (3)	Adequacy of inflow design control system plan.	Yes	Flood control system adequately managed inflow and peak discharge during the 1,000-year, 24-hour, Inflow Design Flood [8].	Yes	No changes were identified that may affect this requirement.
	§257.82(b)	Discharge from CCR Unit	Yes	Discharge into Waters of the United States is not expected during 1,000-year, 24-hour Inflow Design Flood conditions [8].	Yes	No changes were identified that may affect this requirement.

SECTION 1

INTRODUCTION AND BACKGROUND

This Periodic United States Environmental Protection Agency (USPA) Coal Combustion Residual (CCR) Rule [1] Certification Report was prepared by Geosyntec Consultants (Geosyntec) for Illinois Power Resources Generations, LLC (IPRG) to document the periodic certification of the GMF Pond at the Duck Creek Power Plant (DCPP) located at 17751 North Cilco Road in Canton, Illinois, 61520. The location of Duck Creek is provided in **Figure 1**, and a site plan showing the location of the GMF Pond, among other closed and open CCR units and non-CCR surface impoundments, is provided in **Figure 2**.

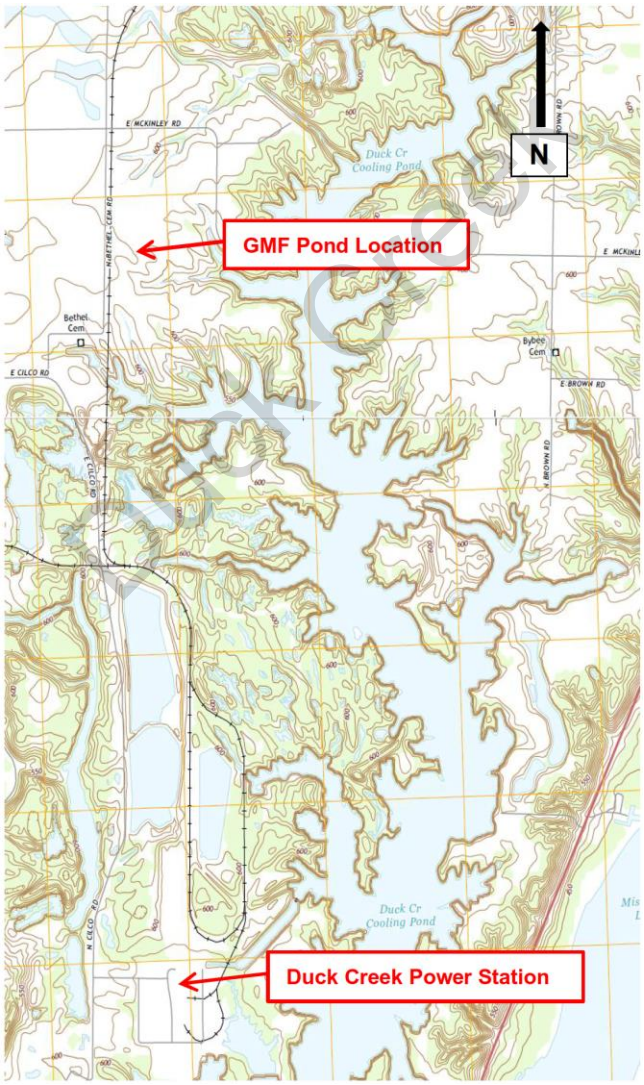


Figure 1 – Site Location Map (from AECOM, 2016)

Figure 2 – Site Plan

1.1 GMF Pond Description

DCPP was retired in 2019. Prior to retirement, two active CCR surface impoundments – the GMF Pond and the Bottom Ash Basin, and one CCR landfill, were used for managing CCRs generated at DCPP [8]. This certification report only pertains to the GMF Pond. The GMF Pond has a "Significant" hazard potential, based on the initial hazard potential classification assessment performed by Stantec in 2016 in accordance with §257.73(a)(2) ([2], [7]).

The GMF Pond served as the wet impoundment basin for gypsum proceeded by the emissions scrubbers at DCPP. The GMF Pond was constructed between 2008 and 2009 and received inflow from three pairs of 10-in diameter high-density polyethylene (HDPE) gypsum slurry pipes. Clear water discharge from the GMF Pond flows downstream into the approximately 8.5-acre GMF Recycle Pond, which is a non-CCR unit, via a lined channel (transfer channel). The transfer channel is approximately 150-ft long, trapezoidal in shape, lined with 60-mil HDPE, has 3H:1V (horizontal to vertical) side slopes, and a depth of 6 ft. Stoplogs are present within the transfer channel that would allow the pool level to be maintained as high as El. 616.0 ft[2]. The channel transitions from a 16-ft bottom width at an invert elevation of 614.0 ft at the upstream end to a 35-ft bottom width at an invert elevation of 609.0 ft at the downstream end. Outflow from the GMF Recycle Pond was formerly pumped back to DCPP to be recycled for use in the wet scrubber system [8]. Currently, the GMF Pond and GMF Recycle Pond are maintained in a zero-discharge configuration, where the only inflows are precipitation flowing directly into the impoundments and the only outflows are evaporation.

The GMF Pond has a composite liner system that is present underneath the entire footprint of the pond and extends up the interior slopes. The liner system includes, from bottom to top, a 3-ft thick layer of compacted clay that is overlain by a geosynthetic clay liner (GCL) and a 60-mil textured HDPE geomembrane, all of which serve as the lower liner. Above the lower liner, a 10-oz

[2] All elevations are in the North American Vertical Datum of 1988 (NAVD88), unless otherwise noted.

geotextile is overlain by a 1-ft thick granular drainage layer and a 4-oz geotextile filter. The upper liner is comprised from bottom to top of a 1-ft thick soil cushion layer and a 60-mil textured HDPE geomembrane. The upper geomembrane liner is exposed at the pond bottom and side slopes [8].

As formerly operated, the normal pool of the GMF Pond was El. 615.0 ft, as controlled by the stoplog structure at the top of the transfer channel. The GMF Pond is approximately 31.6 acres in size and has a total perimeter embankment length of approximately 4,560 ft. The perimeter dike was constructed to include a crest width of approximately 30 ft and crest height ranging from approximately 5 to 10 ft along the eastern side of the pond. The interior of the ponds extends deeper than the exterior slopes; the maximum interior slope height is approximately 45 ft in the southwest corner of the pond. The design elevation of the embankment crest is 620 ft. Both interior and exterior slopes have an orientation of 3.5H:1V (horizontal to vertical).

Initial certifications for the GMF Pond for Hazard Potential Classification (§257.73(a)(2)), History of Construction (§257.73(c)), Structural Stability Assessment (§257.73(d)), Safety Factor Assessment (§257.73(e)(1)), and Inflow Design Flood Control System Plan (§257.82) were completed by Stantec and AECOM in 2016 and 2017 and subsequently posted to IPRG's CCR Website ([2], [3], [4], [5], [6]). Additional documentation for the initial certifications included a detailed operating record reports containing calculations and other information prepared for the hazard potential classification by Stantec [7] and for the structural stability assessment, safety factor assessment, and inflow design flood control system plan by AECOM [8]. These operating record reports were not posted to IPRG's CCR Website.

1.2 Report Objectives

The following objectives are associated with this report:

- Compare site conditions from 2015/2016, when the initial certifications were developed, to site conditions in 2020/2021, when data for the periodic certification was obtained, and evaluate if updates are required to the:
    - §257.73(a)(2) Hazard Potential Classification [2].
    - §257.73(c) History of Construction [3].
    - §257.73(d) Structural Stability Assessment [4].
    - §257.73(e) Safety Factor Assessment [5], and/or
    - §257.82 Inflow Design Flood Control System Plan [6].
- Independently review the Hazard Potential Classification ([2], [7]), Structural Stability Assessment ([4], [8]), Safety Factor Assessment ([5], [8]), and Inflow Design Flood

Control System Plan ([6], [8]) reports to determine if updates may be required based on technical considerations.

  - The History of Construction report [3] was not independently reviewed for technical considerations, as this report contained historical information primarily developed prior to promulgation of the CCR Rule [1] for the CCR units at DCPP, and did not include calculations or other information used to certify performance and/or integrity of the impoundments under §257.73(a)(2), §257.73(c)-(e), or §257.82.

- Confirm that the GMF Pond meets all of the requirements associated with §257.73(a)(2), (c), (d), (e), and §257.82, or, if the GMF Pond does not meet any of these requirements, provide recommendations for compliance with those sections of the CCR Rule [1].

SECTION 2

COMPARISION OF INITIAL AND PERIODIC SITE CONDITIONS

2.1 Overview

This section describes the comparison of conditions at the GMF Pond between the start of the initial CCR certification program in 2015 and 2016 (initial conditions) and subsequent collection of periodic certification site data in 2020 and 2021 (periodic conditions).

2.2 Review of Annual Inspection Reports

Annual onsite inspections for the GMF Pond were performed between 2016 and 2020 ([9], [10], [11], [12], [13]) were certified by a licensed professional engineer in accordance with §257.83(b). Each inspection report stated the following information, relative to the previous inspection:

- A statement that no changes in geometry of the impounding structure were observed since the previous inspection;
- A statement that no instrumentation was present;
- Approximate volumes of impounded water and CCR at the time of inspection;
- A statement that no appearances of actual or potential structural weakness or other disruptive conditions were observed; and
- A statement that no other changes which may have affected the stability or operation of the impounding structure were observed.

In summary, the reports did not indicate any significant changes to the GMF Pond between 2015 and 2020. No signs of instability, structural weakness, or changes which may have affected the operation or stability of the GMF Pond were noted in the inspection reports.

2.3 Review of Instrumentation Data

Multiple groundwater monitoring wells are present around the GMF Pond. Eight of the groundwater monitoring wells, G50S, G51S, G54C, G57C, G57S, G60S, G64S, and X301 have been monitored periodically since by IPRG. Water level readings were provided from December 2, 2015 through June 21, 2021 for most of the wells, with the exception of X301, for which water level readings were provided starting on March 2, 2015, and G54C, for which readings were provided starting on April 14, 2021. Geosyntec reviewed the water levels to evaluate if significant fluctuations, partially increases in phreatic levels, may have occurred between development of the

initial structural stability and factor of safety certifications ([4], [5], [8]) and June 21, 2021. Available monitoring well water levels are plotted in **Attachment A**.

In summary, only minor changes in phreatic conditions were observed in the available monitoring well level data. Phreatic levels typically exhibited consistent seasonal variations of 5 to 10 ft, with the exception of X301 and G54C, which varied by approximately 2 ft. These levels do not significantly differ from those utilized for the initial structural stability and factor of safety certifications ([4], [5], [8]).

2.4 Comparison of Initial to Periodic Surveys

The initial survey of the GMF Pond, conducted by Weaver Consultants (Weaver) in 2015 [14], was compared to the periodic survey of the GMF Pond, conducted by IngenAE, LLC (IngenAE) in 2020 [15], using AutoCAD Civil3D 2021 software. This comparison quantified changes in the volume of CCR placed within the GMF Pond and considered volumetric changes above and below the starting water surface elevation (SWSE) used for the 2016 §257.82 inflow design flood control plan hydraulic analysis [6]. Potential changes to embankment geometry were also evaluated. This comparison is presented in side-by-side comparison of the two surveys in **Drawing 1,** and a plan view isopach map denoting changes in ground surface elevation in **Drawing 2**. A summary of the water elevations and changes in CCR volumes is provided in **Table 2**.

Table 2 – Initial to Periodic Survey Comparison

Initial Surveyed Pool Elevation (ft)	614.2
Periodic Surveyed Pool Elevation (ft)	613.9
Initial §257.82 Starting Water Surface Elevation (SWSE) (ft)	616.0
Total Change in CCR Volume* (CY)	+ 8,000 (Fill)
Change in CCR Volume Above SWSE* (CY)	- 9,000 (Cut)
Change in CCR Volume Below SWSE* (CY)	+ 17,000 (Fill)

*All volumes rounded to the nearest 1,000 CY

The comparison indicated that approximately 8,000 CY of CCR was placed in the GMF Pond between the initial and periodic surveys. The CCR was placed entirely below the SWSE and a net cut occurred above the SWSE. CCR grades above the SWSE were generally similar to the initial survey (e.g., within +/- 2 ft). These changes are considered unlikely to result in increase in the peak water surface elevation (PWSE) during a flood event, as additional flood storage is present relative to conditions observed in 2015. No significant changes to embankment geometry appeared to have occurred between the initial and periodic surveys.

2.5 Comparison of Initial to Periodic Aerial Photography

Initial aerial photographs of the GMF Pond collected by Weaver in 2015 [14] were compared to periodic aerial photographs collected by IngenAE in 2020 [15] to visually evaluate if potential site changes (i.e., changes to the embankment, outlet structures, limits of CCR, other appurtenances)

may have occurred. A comparison of these aerial photographs is provided in **Drawing 3**. No significant changes were noted during this comparison.

2.6 Comparison of Initial to Periodic Site Visits

An initial site visit to the GMF Pond was conducted by AECOM in 2015 and documented with a Site Visit Summary and corresponding photographs [16]. A periodic site visit was conducted by Geosyntec on May 27, 2021, with Mr. Lucas P. Carr, P.E. conducting the site visit. The site visit was intended to evaluate potential changes at the site since the initial certifications were prepared (i.e., modification to the embankment, outlet structures or other appurtenances, limits of CCR, maintenance programs, repairs), in addition to performing visual observations of the GMF Pond to evaluate if the structural stability requirements (§257.73(d)) were still met. The stie visit included walking the perimeter of the GMF Pond, visually observing conditions, recording field notes, and collecting photographs. The site visit is documented in a photographic log provided in **Appendix A**. A summary of significant findings from the periodic site visit is provided below:

- Overall site maintenance appears to be similar to conditions observed in 2015.
- No signs or structural stability, erosion, or required maintenance items were observed during the stie visit.

2.7 Interview with Power Plant Staff

An interview with Mr. Daryl Johnson and Mr. Brandon Potter of the DCPP was conducted by Lucas P. Carr, P.E. of Geosyntec on May 27, 2021. Mr. Johnson, at the time of the interview, had been employed at the DCPP for 8 years and was responsible for environmental compliance and completed weekly CCR inspections on some years, including for the GMF Pond, in addition to managing vegetation maintenance. Mr. Potter, at the time of the interview, had been employed at DCPP for 10 years and assisted in the inspection and operation of the GMF Pond. The interview included a discussion of included a discussion of potential changes that that may have occurred at the GMF Pond since development of the initial certifications ([2], [7], [3], [4], [5], [6], [8]).

- Were any construction projects completed for the GMF Pond since 2015, and, if so, are design drawings and/or details available?
    - No.
- Were there any changes to the purpose of the GMF Pond since 2015?
    - The DCPP was closed in December of 2019. Sluicing into the GMF Pond and pumping of water from the GMF Recycle Pond was stopped at this time.
- Were there any changes to the to the instrumentation program and/or physical instruments for the GMF Pond since 2015?

  - The GMF Pond does not have instrumentation, so no changes occurred.

- Have area-capacity curves for the GMF Pond been prepared since 2015?
  - No known area-capacity curves have been developed.
- Were there any changes to spillways and/or diversion features for the GMF Pond completed since 2015?
  - No.
- Were there any changes to construction specifications, surveillance, maintenance, and repair procedures for the GMF Pond since 2015?
  - No.
- Were there any instances of dike and/or structural instability for the GMF Pond since 2015?
  - No known instances occurred.

SECTION 3

HAZARD POTENTIAL CLASSIFICATION - §257.73(a)(2)

3.1 Overview of Initial HPC

The Initial Hazard Potential Classification (Initial HPC) was prepared by Stantec Consulting Services, Inc. (Stantec) in 2016 ([2], [7]), following the requirements of §257.73(a)(2). The Initial HPC included the following information:

- Visual analysis to evaluate potential hazards associated with a failure of the GMF Pond perimeter dike, along the north, south, east, and west embankments of the GMF Pond.
- Evaluation of potential breach flow paths using elevation data and aerial imagery to assess potential impacts to downstream structures, infrastructure, and waterways.
- While a breach map is not included within the Initial HPC, it included within the §257.73(a)(3) Initial Emergency Action Plan (Initial EmAP) [17].

The visual analysis indicated that only structures owned by DCPP were within the potential breach path, and that public impacts were limited to portions of North Bethel Cemetery Road and the railroad leading to the Power Plant. The reported noted that North Bethel Cemetery Road is intermittently used, and the at-risk population was considered transient. The Initial HPC concluded that breach of the GMF pond would be unlikely to result in a probable loss of human life, although the breach could cause CCR to be released into downstream waterways, thereby causing environmental damage. The Initial HPC therefore recommended a "Significant" hazard potential classification for the GMF Pond [2].

3.2 Review of Initial HPC

Geosyntec performed a review of the Initial HPC ([2], [7]), in terms of technical approach, assessment of the results, and applicable requirements of the CCR Rule [1]. No significant technical issues were noted within the technical review, although a detailed review (e.g., check) of the calculations was not performed as the initial HPC utilized a visual assessment.

3.3 Summary of Site Changes Affecting the Initial HPC

Geosyntec did not identify any changes at the site that may affect the HPC. No new structures, infrastructure, frequently occupied facilities/areas, or waterways were observed to be present in the probable breach area indicated in the Initial EmAP [17]. Additionally, no significant changes to the topography in the probable breach were identified.

3.4 Periodic HPC

Geosyntec recommends retaining the "Significant" hazard potential classification for the GMF Pond, per §257.73(A)(2), based on the lack of site changes potentially affecting the Initial HPC occurring since the initial HPC was developed, as described in **Section 3.3**, and the lack of significant review comments, as described in **Section 3.2**. Updates to the Initial HPC reports ([2], [7]) are not recommended at this time.

SECTION 4

HISTORY OF CONSTRUCTION REPORT - §257.73(c)

4.1 Overview of Initial HoC

The Initial History of Construction report (Initial HoC) was prepared by AECOM in 2016 [3] following the requirements of §257.73(c) and included information on all non-incised CCR surface impoundments at DCPP, including the GMF Pond, Ash Pond No. 1, and Ash Pond No. 2. This report only discusses the HoC as it pertains to the GMF Pond. The Initial HoC included the following information for the GMF Pond:

- The name and address of the owner/operator,
- Location maps,
- Statements of purpose,
- The names and size of the surrounding watershed,
- A description of the foundation and abutment materials,
- A description of the dike materials,
- Approximate dates and stages of construction,
- Available design and engineering drawings,
- A summary of instrumentation,
- Area-capacity curves for the GMF Pond,
- Information on spillway structures,
- Construction specifications,
- Inspection and surveillance plans,
- A statement that operations and maintenance plans are being generated or revised, and that the report will be updated when the new plans are available,
- A statement that no known historical structural instability has occurred at the CCR surface impoundments.

4.2 Summary of Site Affecting the Initial HoC

One significant change at the site that occurred after development of the initial HoC report [3] was identified and is described below:

- Electricity generation at the DCPP ceased in December of 2019 and the pumping of inflow and outflow into and from the GMF Recycle Pond ceased at this time.
    - An update to the HoC report was performed to state that the DCPP is no longer active and the GMF Pond is no lower receiving inflows and outflow is no longer pumped back to the DCPP. A letter documenting changes to the HoC report is provided in **Attachment C**.

SECTION 5

STRUCTURAL STABILITY ASSESSMENT - §257.73(d)

5.1 Overview of Initial SSA

The Initial Structural Stability Assessment (Initial SSA) was prepared by AECOM in 2016 ([4], [8]), following the requirements of §257.73(d)(1), and included the following evaluations:

- Stability of dike foundations, dike abutments, slope protection, dike compaction, and slope vegetation,
- Spillway stability including capacity, structural stability and integrity; and
- Downstream slope stability under sudden drawdown conditions for a downstream water body.

The Initial SSA ([4], [8]) concluded that the GMF Pond met all structural stability requirements for §257.73(d)(1)(i)-(vii). This included noting that the structural integrity of hydraulic structures (§257.73(d)(1)(vi)) was not applicable, due to no hydraulic structures penetrating or underlying the base of the GMF Pond. Additionally, it was noted that the stability of downstream slopes inundated by water bodies (§257.73(d)(1)(vii) was also not applicable, due to inundation of the downstream slopes not being expected.

5.2 Review of Initial SSA and Updated Periodic SSA

Geosyntec performed a review of the Initial SSA ([4], [8]) in terms of technical approach, calculation input parameters and methodology, recommendations, and completeness. The review included the following tasks:

- Reviewing photographs collected in 2015 and used to demonstrate compliance with §257.73(d)(1)(i)-(vii).
- Reviewing geotechnical calculations used to demonstrate the stability of foundations, per §257.73(d)(1)(i) and sufficiency of dike compaction, per §257.73(d)(1)(iii), in terms of supporting geotechnical investigation and testing data, input parameters, analysis methodology, selection of critical cross-sections, and loading conditions.
- Review of the methodology used to demonstrate that a downstream water body that could induce a sudden drawdown condition, per §257.73(d)(1)(vii), is not present.

One review comment and corresponding recommended technical update was identified during review of the geotechnical analyses supporting the sufficiency of dike compaction

(§257.73(d)(1)(i)) and foundation and abutment stability (§257.73(d)(1)(iii) portions of the Initial SSA. These analyses were performed for the Initial Safety Factor Assessment (SFA) but also utilized to support the initial SSA. The review comment and subsequent updates the Initial SFA, are discussed in **Section 6.**

5.3 Summary of Site Changes Affecting the Initial SSA

No changes since development of the Initial SSA were identified that would require updates to the Initial SSA ([4], [8]).

5.4 Periodic SSA

The updated Periodic SFA (**Section 7**) indicates that foundations and abutments are stable and dike compaction is sufficient for expected ranges in loading conditions, as slope stability factors of safety for slip surfaces passing through the dike and foundation were found to meet or exceed the requirements of §257.73(e)(1), including for static maximum storage pool conditions and post-earthquake (i.e., liquefaction) loading conditions considering seismically-induced strength loss in the foundation soils. Therefore, the requirements of §257.73(d)(1)(i) and §257.73(d)(1)(iii) are met for the Periodic SSA.

SECTION 6

SAFETY FACTOR ASSESSMENT - §257.73(e)(1)

6.1 Overview of Initial SFA

The Initial Safety Factor Assessment (Initial SFA) was prepared by AECOM in 2016 ([5], [8]) following the requirements of §257.73(e)(1). The Initial SFA included the following information:

- A geotechnical investigation program with in-situ and laboratory testing;
- An assessment of the potential for liquefaction in the dike and foundation soils;
- The development of a single slope stability cross-sections for limit equilibrium stability analysis utilizing GeoStudio SLOPE/W software; and
- The analysis of the cross-section for maximum storage pool, maximum surcharge pool, and seismic loading conditions.
    - Liquefaction loading conditions were not evaluated as liquefaction-susceptible soil layers were not identified in either the embankments or foundation soils.

The Initial SFA concluded that the GMF Pond met all safety factor requirements, per §257.73(e), as all calculated safety factors were equal to or higher than the minimum required values.

6.2 Review of Initial SFA

Geosyntec performed a review of the Initial SFA ([5], [8]) in terms of technical approach, calculation input parameters and methodology, recommendations, and completeness. The review included the following tasks:

- Reviewing geotechnical calculations used to demonstrate the acceptable safety factors, per §257.73(e)(1), in terms of:
    - Completeness and adequacy of supporting geotechnical investigation and testing data;
    - Completeness and approach of liquefaction triggering assessments; and
    - Input parameters, analysis methodology, selection of critical cross-sections, and loading conditions utilized for slope stability analyses.
    - Phreatic conditions based on piezometric data collected between March 2, 2015 June 21, 2021, as discussed in **Section 2.3**.

One review comment was identified during review of the Initial SFA. The comment and the is described below:

- The Initial SFA utilized a single cross-section (A-A') along the eastern embankment where the exterior slope is approximately 8 ft tall. However, the maximum height of the exterior slope is approximately 11 ft at the southwest corner of the embankment.

6.3 Summary of Site Changes Affecting the Initial SFA

No changes since development of the Initial SFA were identified that would require updates to the Initial SFA ([5], [8]).

6.4 Periodic SFA

Following review of the Initial SFA ([5], [8]), Geosyntec developed a new slope stability analysis cross-section (B-B') at the southwest corner of the GMF Pond embankment to account for the maximum embankment height of 11 ft. The model was developed utilizing the following approach and input data:

- Ground surface geometry was obtained from the 2020 survey of the GMF Pond [15].

- Subsurface stratigraphy was obtained from 2007 borings B-53 and B-67, as provided in the Initial SFA report [8]. Geosyntec reviewed the boring data and determined that subsurface conditions were similar to conditions at cross-section A-A'. Therefore, the soil properties (i.e., strength, unit weight) from the Initial SFA ([5], [8]) were utilized for cross-section B-B',

- Piezometric levels in the foundation soils were assumed to follow the ground surface past the embankment toe, per providing readings from monitoring wells G51S and G54C; and,

- All other analysis settings and input data from the Initial SFA ([5], [8]) was utilized, including, but not limited to, software package and version, slip surface search routines and methods, and pseudostatic seismic coefficients.

Factors of safety form the Periodic SFA (cross-section B-B') and Initial SFA (cross-section A-A') are summarized in **Table 3** and confirm that the GMF Pond meets the requirements of §257.73(e)(1). A location of the cross-section B-B' in plan and analysis output data for cross-section B-B' is provided in **Attachment D**.

Table 3 – Factors of Safety from Periodic SFA

	Structural Stability Assessment (§257.73(d)) and Safety Factor Assessment (§257.73(e))				Structural Stability Assessment (§257.73(d))
Cross-Section	**Maximum Storage Pool §257.73(e)(1)(i) Minimum Required = 1.50**	**Maximum Surcharge Pool §257.73(e)(1)(ii) Minimum Required = 1.40**	**Seismic §257.73(e)(1)(iii) Minimum Required = 1.00**	**Dike Liquefaction §257.73(e)(1)(iv) Minimum Required = 1.20**	**Foundation Liquefaction §257.73(d)(1)(i) Minimum Required = 1.20**
A-A'	4.27	4.26	2.37	N/A	N/A
B-B'	3.47*	3.47*	1.88*	N/A	N/A

Notes:
[1]Denotes cross-section where results from the Initial SFA are presented due to no observed changes relative to the Initial IDF.
[2]Denotes cross-section where changes are occurred, and results are presented from the updated Periodic SFA.
*Indicates critical cross-section (i.e., lowest calculated factor of safety out of the two cross-sections analyzed)
N/A – Loading condition is not applicable.

SECTION 7

INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN - §257.82

7.1 Overview of Initial IDF

The Initial Inflow Design Flood Control System Plan (Initial IDF) was prepared by AECOM in 2016 ([6], [8]) following the requirements of §257.82. The Initial IDF included the following information:

- A hydraulic and hydrologic analysis, performed for the 1,000-year design flood event because of the hazard potential classification of "significant", which corresponded to 9.37 inches of rainfall over a 24-hour period.
- The Initial IDF utilized a HydroCAD Version 8.5 model to evaluate spillway flows and pool level increases during the design flood, with a SWSE of 616.0 ft.

The Initial IDF ([6], [8]) concluded that the GMF Pond met the requirements of §257.82, as the peak water surface estimated by the HydroCAD model was El. 618.3 ft, relative to a minimum GMF Pond dike crest elevation of 620.0 ft. Therefore, overtopping was not expected. The Initial IDF also evaluated the potential for discharge from the CCR unit and determined that discharge into Waters of the United States and no overtopping was expected during the 1,000-year design flood.

7.2 Review of Initial IDF

Geosyntec performed a review of the Initial IDF ([6], [8]) in terms of technical approach, calculation input parameters and methodology, recommendations, and completeness. The review included the following tasks:

- Reviewing the return interval used vs. the hazard potential classification.
- Reviewing the rainfall depth and distribution for appropriateness.
- Performing a high-level review of the inputs to the hydrological modeling.
- Reviewing the hydrologic model parameters for spillway parameters, starting pool elevation, and storage vs. the reference data.
- Reviewing the overall Initial IDF vs. the applicable requirements of the CCR Rule [1].

No significant technical issues were noted within the technical review, although a detailed review (e.g., check) of the calculations was not performed.

7.3 Summary of Site Changes Affecting the Initial IDF

No changes since development of the Initial IDF were identified that would require updates to the Initial IDF ([6], [8]).

SECTION 8

CONCLUSIONS

The GMF Pond at DCPP was evaluated relative to the USEPA CCR Rule periodic assessment requirements for:

- Hazard potential classification (§257.73(a)(2)),
- History of Construction reporting (§257.73(d)),
- Structural stability assessment (§257.73(d)),
- Safety factor assessment (§257.73(e)), and
- Inflow design flood control system planning (§257.82).

Based on the evaluations presented herein, the referenced requirements are satisfied.

SECTION 9

CERTIFICATION STATEMENT

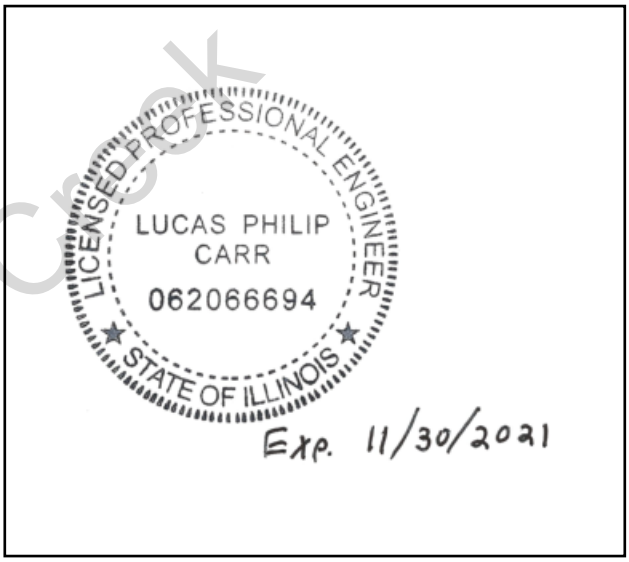
CCR Unit: Illinois Power Resources Generation, LLC; Duck Creek Power Plant, GMF Pond

I, Lucas P. Carr, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this 2021 USEPA CCR Rule Periodic Certification Report, has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the periodic assessment of the hazard potential classification, history of construction report, structural stability, emergency action plan, safety factors, and inflow design flood control system planning, dated October 2021, were conducted in accordance with the requirements of 40 CFR §257.73(a)(2), (c), (d), (e), and §257.82.

Lucas P. Carr

10/11/2021

Date



SECTION 10

REFERENCES

[1] United States Environmental Protection Agency, 40 CFR Parts 257 and 261; Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, 2015.

[2] Stantec Consulting Services Inc., "Initial Hazard Potential Classification Assessment, EPA Final CCR Rule, GMF Pond, Duck Creek Power Station, Fulton County, Illinois," Fenton, MO, October 12, 2016.

[3] AECOM, "History of Construction, USEPA Final CFR Rule, 40 CFR §257.73(c), Duck Creek Power Station, Canton, Illinois," October 2016.

[4] AECOM, "CCR Rule Report: Initial Structural Stability Assessment for GMF Pond at Duck Creek Power Station," October 2016.

[5] AECOM, "CCR Rule Report: Initial Safety Factor Assessment for GMF Pond at Duck Creek Power Station," St. Louis, MO, October 2016.

[6] AECOM, "CCR Rule Report: Initial Inflow Design Flood Control System Plan for GMF Pond at Duck Creek Power Station," October 2016.

[7] Stantec Consulting Services Inc., "Documentation of Initial Hazard Potential Classification Assessment, GMF Pond, Duck Creek Power Station, Fulton County, Illinois," October 12, 2016.

[8] AECOM, "CCR Certification Report: Initial Structural Stability Assessment, Initial Safety Factor Assessment, and Initial Inflow Design Flood Control System Plan for GMF Pond at Duck Creek Power Station," October 2016.

[9] J. Knutelski and J. Campbell, "Annual CCR Surface Impoundment Inspection Report (per 40 CFR 257.83(b)(2)), Duck Creek Power Station, GMF Pond," January 18, 2017.

[10] J. Knutelski and J. Campbell, "Annual CCR Surface Impoundment Inspection Report (per 40 CFR 257.83(b)(2)), Duck Creek Power Station, GMF Pond," February 7, 2018.

[11] J. Knutelski, "Annual Inspection by a Qualified Professional Engineer, 40 CFR §2357.83(b), Duck Creek Power Station, GMF Pond," January 10, 2019.

[12] J. Knutelski, "Annual Inspection by a Qualified Professional Engineer, 40 CFR §257.83(b), Duck Creek Power Station, GMF Pond," January 8, 2020.

[13] J. Knutelski, "Annual Inspection by a Qualified Professional Engineer, 40 CFR §257.83(b), Duck Creek Power Station, GMF Pond," January 6, 2021.

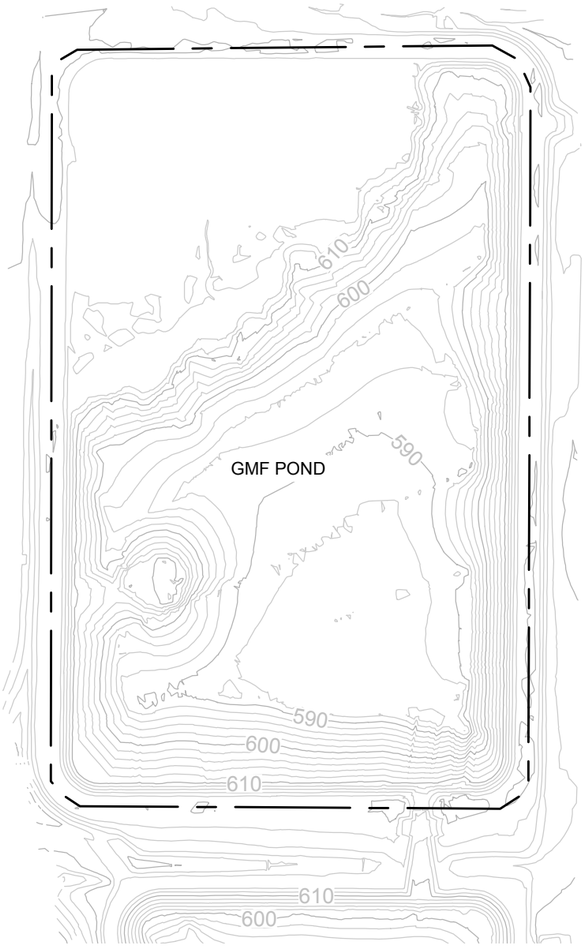
[14] Weaver Consultants Group, "Dynegy, Collinsville, Illinois, 2015 - Duck Creek Existing Topography," December 1, 2015.

[15] IngenAE, "Luminant, Illinois Power Resrouces Generating, LLC, Duck Creek Power Station, December 2020 Topography," February 9, 2021.

[16] AECOM, "Initial Site Visit CCR Unit Summary, Dynegy CCR Compliance Program - Duck Creek, Duck Creek GMF Primary Pond," June 23, 2015.

[17] Stantec Consulting Services Inc., "Duck Creek Power Station, Emergency Action Plan (EAP)," April 13, 2017.

DRAWINGS



INITIAL SURVEY
12-01-2015 TOPOGRAPHY

PERIODIC SURVEY
02-09-2021 TOPOGRAPHY

0 300
SCALE IN FEET

NOTES:

1. THE INITIAL SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “DYNEGY, COLLINSVILLE, ILLINOIS, 2015 - DUCK CREEK EXISTING TOPOGRAPHY”, PREPARED BY WEAVER CONSULTANTS GROUP, DATED DECEMBER 1, 2015.
2. THE PERIODIC SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “LUMINANT, ILLINOIS POWER RESOURCES GENERATING, LLC, DUCK CREEK POWER STATION, DECEMBER 2020 TOPOGRAPHY”, PREPARED BY INGENAE, DATED FEBRUARY 9, 2021.
3. ALL SURVEY DATA WAS COLLECTED IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND NORTH AMERICAN DATUM OF 1983 (NAD83) FOR VERTICAL AND HORIZONTAL COORDINATES, RESPECTIVELY.

INITIAL TO PERIODIC SURVEY COMPARISON
GMF POND
DUCK CREEK POWER STATION
CANTON, ILLINOIS

Geosyntec consultants

DRAWING 1

GLP8027.03 | MAY 2021

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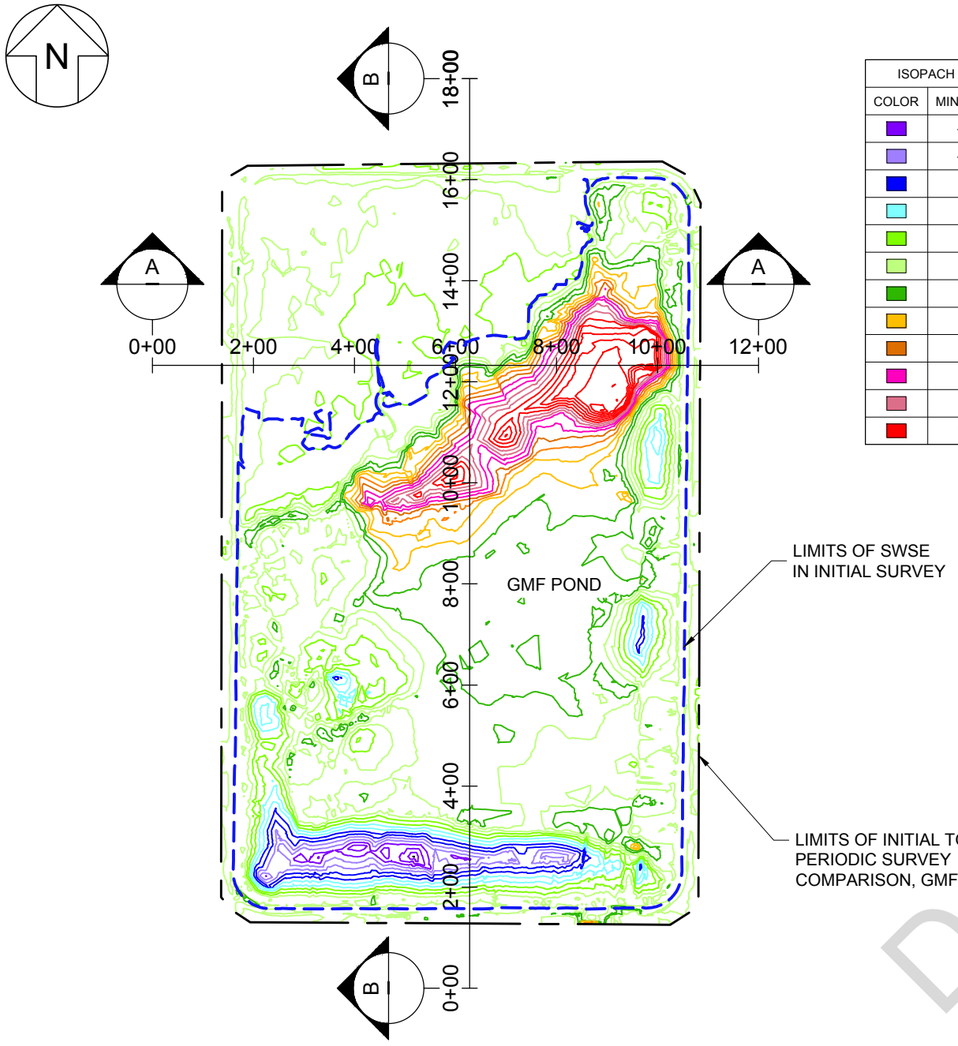

ISOPACH CONTOUR KEY		
COLOR	MIN ELEV	MAX ELEV
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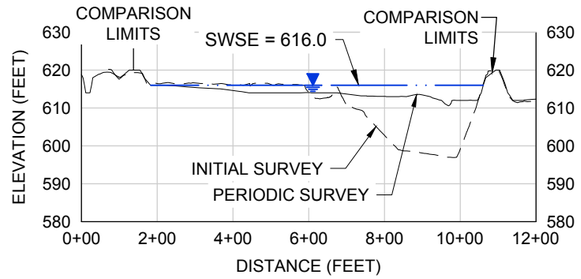
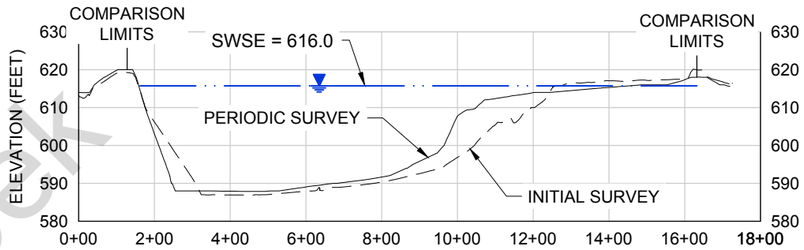
	-10	-8
	-8	-6
	-6	-4
	-4	-2
	-2	0
	0	2
	2	4
	4	6
	6	8
	8	10
	10	17



SECTION A



SECTION B

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VERT: SCALE IN FEET

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HORZ: SCALE IN FEET

0 300
SCALE IN FEET

INITIAL TO PERIODIC SURVEY COMPARISON SUMMARY			
SURFACE IMPOUNDMENT	CUT*	FILL*	NET (CU. YD.)*
GMF POND	54,000	62,000	8,000 (FILL)
ABOVE SWSE	10,000	1,000	9,000 (CUT)
BELOW SWSE	44,000	61,000	17,000 (FILL)

* ALL VOLUMES ROUNDED TO THE NEAREST 1,000 CY

NOTES:

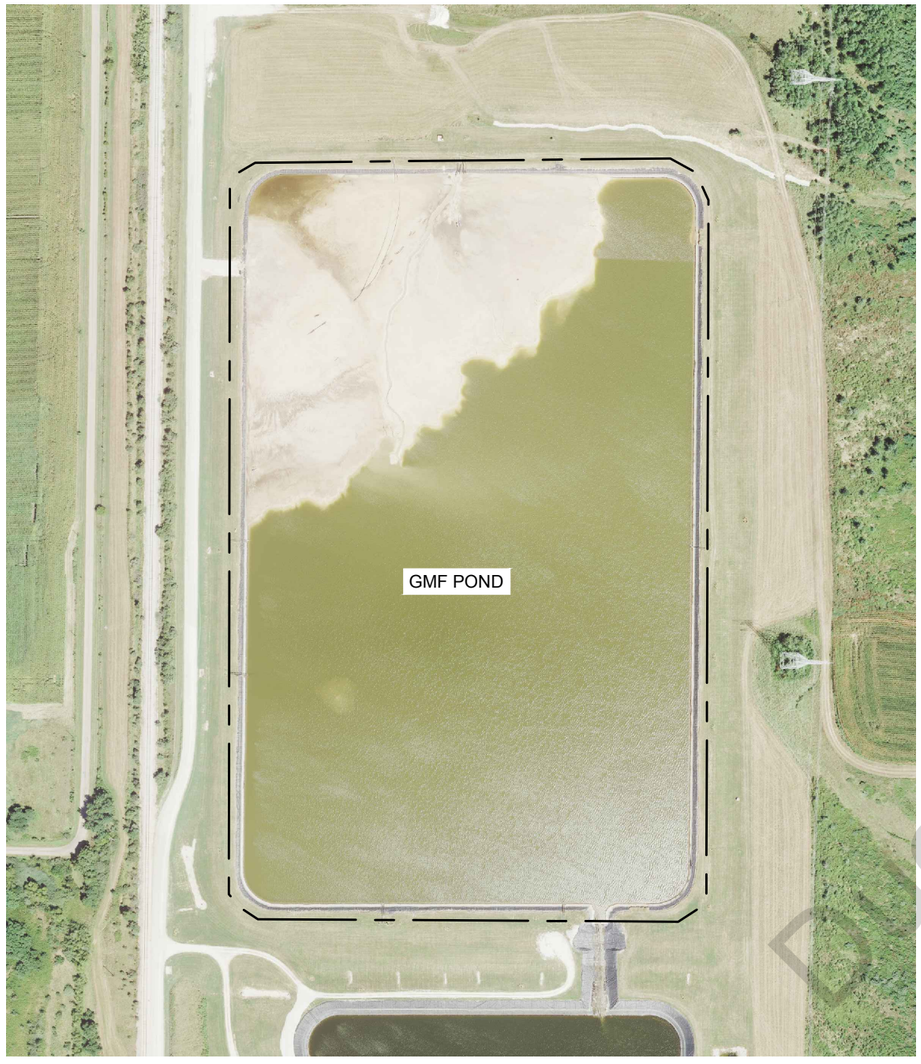
1. THE INITIAL SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “DYNEGY, COLLINSVILLE, ILLINOIS, 2015 - DUCK CREEK EXISTING TOPOGRAPHY”, PREPARED BY WEAVER CONSULTANTS GROUP, DATED DECEMBER 1, 2015.
2. THE PERIODIC SURVEY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “LUMINANT, ILLINOIS POWER RESOURCES GENERATING, LLC, DUCK CREEK POWER STATION, DECEMBER 2020 TOPOGRAPHY”, PREPARED BY INGENAE, DATED FEBRUARY 9, 2021.
3. ALL SURVEY DATA WAS COLLECTED IN THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) AND NORTH AMERICAN DATUM OF 1983 (NAD83) FOR VERTICAL AND HORIZONTAL COORDINATES, RESPECTIVELY.
4. THE STARTING WATER SURFACE ELEVATION (SWSE) OF THE GMF POND IS EL. 616.0 FT, AS NOTED IN THE REPORT TITLED “CCR CERTIFICATION REPORT: INITIAL STRUCTURAL STABILITY ASSESSMENT, INITIAL SAFETY FACTOR ASSESSMENT, AND INITIAL INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN FOR GMF POND AT DUCK CREEK POWER STATION”, PREPARED BY AECOM, DATED OCTOBER, 2016.

GMF POND
DUCK CREEK POWER PLANT
CANTON, ILLINOIS

Geosyntec consultants

DRAWING 2

GLP8027.03 | AUGUST 2021



INITIAL AERIAL
12-01-2015 IMAGERY

PERIODIC AERIAL
02-09-2021 IMAGERY

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SCALE IN FEET

NOTES:

1. THE INITIAL IMAGERY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “DYNEGY, COLLINSVILLE, ILLINOIS, 2015 - DUCK CREEK EXISTING TOPOGRAPHY”, PREPARED BY WEAVER CONSULTANTS GROUP, DATED DECEMBER 1, 2015.
2. THE PERIODIC IMAGERY WAS TAKEN FROM THE DRAWING PACKAGE TITLED “LUMINANT, ILLINOIS POWER RESOURCES GENERATING, LLC, DUCK CREEK POWER STATION, DECEMBER 2020 TOPOGRAPHY”, PREPARED BY INGENAE, DATED FEBRUARY 9, 2021.

INITIAL TO PERIODIC AERIAL IMAGERY
COMPARISON
GMF POND
DUCK CREEK POWER STATION
CANTON, ILLINOIS

Geosyntec consultants

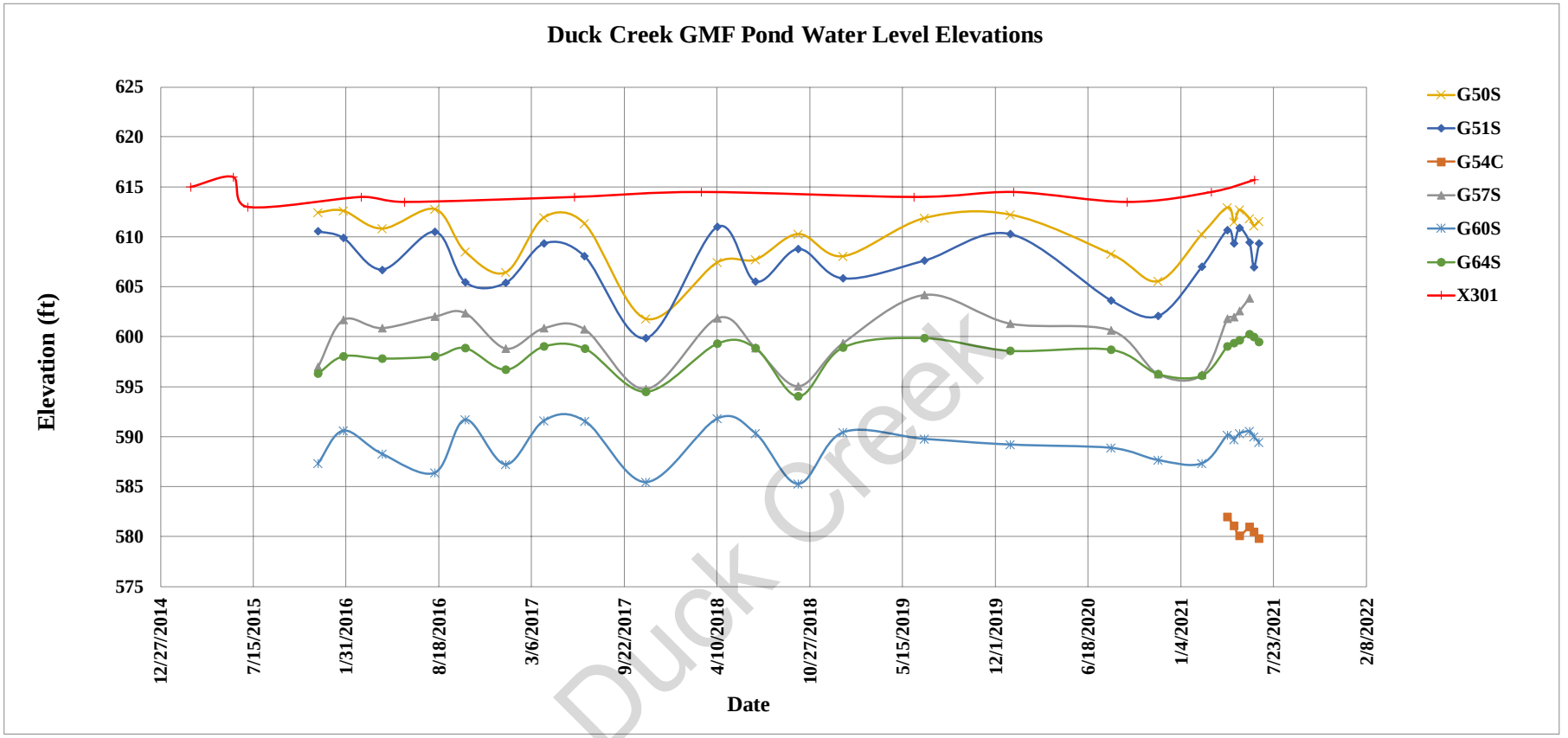
DRAWING
3

GLP8027.03 | MAY 2021

ATTACHMENTS

Attachment A

GMF Pond Piezometer Data Plots



NOTES:
1. Piezometeric data was taken from the spreadsheet titled "DC_GW_Elev_Export_Vistra_20210722", provided by the Duck Creek Power Plant.

PIEZOMETER DATA PERIODIC CERTIFICATION DUCK CREEK POWER PLANT- GMF POND FULTON, ILLINOIS		
Geosyntec consultants		Figure 1
GLP8027	7/23/2021	

Attachment B

GMF Pond Site Visit Photolog

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Resources Generating **Project Number:** GLP8027

CCR Unit: GMF Pond (GMFP) **Site:** Duck Creek Power Plant

Photo: 01 **Date:** 05/27/2021 **Direction Facing:** SE **Comments:** GMFP north overview	
Photo: 02 **Date:** 05/27/2021 **Direction Facing:** S **Comments:** GMFP north overview	

GEOSYNTEC CONSULTANTS
Photographic Record

Site Owner: Illinois Power Resources Generating **Project Number:** GLP8027

CCR Unit: GMF Pond (GMFP) **Site:** Duck Creek Power Plant

Photo: 03 **Date:** 05/27/2021 **Direction Facing:** E **Comments:** GMFP north interior slope and crest.	
Photo: 04 **Date:** 05/27/2021 **Direction Facing:** E **Comments:** GMFP north exterior slope and crest.	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Resources Generating **Project Number:** GLP8027

CCR Unit: GMF Pond (GMFP) **Site:** Duck Creek Power Plant

Photo: 05 **Date:** 05/27/2021 **Direction Facing:** S **Comments:** GMFP east exterior slope and crest.	
Photo: 06 **Date:** 05/27/2021 **Direction Facing:** N **Comments:** GMFP east exterior slope and crest.	

GEOSYNTEC CONSULTANTS
Photographic Record

Site Owner: Illinois Power Resources Generating **Project Number:** GLP8027

CCR Unit: GMF Pond (GMFP) **Site:** Duck Creek Power Plant

Photo: 07 **Date:** 05/27/2021 **Direction Facing:** S **Comments:** GMFP east interior slope and crest.	
Photo: 08 **Date:** 05/27/2021 **Direction Facing:** S **Comments:** GMFP east slope crest.	

GEOSYNTEC CONSULTANTS
Photographic Record

Site Owner: Illinois Power Resources Generating **Project Number:** GLP8027

CCR Unit: GMF Pond (GMFP) **Site:** Duck Creek Power Plant

Photo: 09 **Date:** 05/27/2021 **Direction Facing:** W **Comments:** GMFP south crest and transfer channel.	
Photo: 10 **Date:** 05/27/2021 **Direction Facing:** W **Comments:** GMFP transfer channel and weir. All stoplogs were installed.	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Resources Generating **Project Number:** GLP8027

CCR Unit: GMF Pond (GMFP) **Site:** Duck Creek Power Plant

Photo: 11 **Date:** 05/27/2021 **Direction Facing:** W **Comments:** GMFP south dike interior slope.	
Photo: 12 **Date:** 05/27/2021 **Direction Facing:** NW **Comments:** GMFP southwest corner overview.	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Resources Generating **Project Number:** GLP8027

CCR Unit: GMF Pond (GMFP) **Site:** Duck Creek Power Plant

Photo: 13 **Date:** 05/27/2021 **Direction Facing:** W **Comments:** GMFP southwest corner exterior dike overview.	
Photo: 14 **Date:** 05/27/2021 **Direction Facing:** N **Comments:** GMFP west dike overview.	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Resources Generating **Project Number:** GLP8027

CCR Unit: GMF Pond (GMFP) **Site:** Duck Creek Power Plant

Photo: 15 **Date:** 05/27/2021 **Direction Facing:** N **Comments:** GMFP west interior dike overview.	
Photo: 16 **Date:** 05/27/2021 **Direction Facing:** N **Comments:** GMFP west exterior dike overview.	

GEOSYNTEC CONSULTANTS
Photographic Record

Geosyntec consultants

Site Owner: Illinois Power Resources Generating **Project Number:** GLP8027

CCR Unit: GMF Pond (GMFP) **Site:** Duck Creek Power Plant

Photo: 17 **Date:** 05/27/2021 **Direction Facing:** N **Comments:** GFMP west interior dike overview.	
Photo: 18 **Date:** 05/27/2021 **Direction Facing:** N **Comments:** GMFP west exterior dike overview.	

GEOSYNTEC CONSULTANTS
Photographic Record

Site Owner: Illinois Power Resources Generating **Project Number:** GLP8027

CCR Unit: GMF Pond (GMFP) **Site:** Duck Creek Power Plant

Photo: 19 **Date:** 05/27/2021 **Direction Facing:** E **Comments:** GMFP northwest corner overview.	
Photo: 20 **Date:** 05/27/2021 **Direction Facing:** S **Comments:** GMFP west dike overview.	

Attachment C

Periodic History of Construction Report Update Letter

Geosyntec consultants

1 McBride and Son Center Drive, Suite 202
Chesterfield, MO 63005
PH 636-812-0800
www.geosyntec.com

October 11, 2021

Illinois Power Resources Generating, LLC
17751 North Cilco Road
Canton, Illinois 61520

Subject: Periodic History of Construction Report Update Letter
USEPA Final CCR Rule, 40 CFR §257.73(c)
Duck Creek Power Plant
Canton, Illinois

At the request of Illinois Power Resources Generating, LLC (IPRG), Geosyntec Consultants (Geosyntec) has prepared this Letter to documents updates to the Initial History of Construction (HoC) report for the Duck Creek Power Plant (DCPP), also known as the Duck Creek Power Station (DUC). The Initial HoC report was prepared by AECOM in October of 2016 [1] in accordance with 40 Code of Federal Regulations (CFR) §257.73(c) of the United States Environmental Protection Agency (USEPA) Coal Combustion Residuals Rule, known as the CCR Rule [2]. This letter also includes information required by Section 845.220(a)(1)(B) (Design and Construction Plans) of the state-specific Illinois Environmental Protection Agency (IEPA) Part 845 CCR Rule [3] that is not expressly required by §257.73(c).

BACKGROUND

The CCR Rule required that, by October 17, 2016, Initial HoC reports to be compiled for existing CCR surface impoundments with: (1) a height of five feet or more and a storage volume of 20 acre-feet or more, or (2) a height of 20 feet or more. The Initial HoC report was required to contain, to the extent feasible, the information specified in 40 CFR §257.73(c)(1)(i)-(xii). The Initial HoC report for DCPP, which included three existing CCR surface impoundments, the GMF Pond (GMFP), Ash Pond No. 1 (AP1), and Ash Pond No. 2 (AP2), was prepared and subsequently posted to IPRG's CCR Website prior to October 17, 2016.

The CCR Rule requires that Initial HoC to be updated if there is a significant change to any information complied in the Initial HoC report, as listed below:

§ 257.73(c)(2): If there is a significant change to any information complied under paragraph (c)(1) of this section, the owner or operator of the CCR unit must update the relevant information and place it in the facility's operating record as required by § 257.105(f)(9).

IPRG retained Geosyntec to review the Initial HoC report, review reasonably and readily available information for the GMFP, AP1, and AP2 generated since the Initial HoC report was prepared, and perform a site visit to DCPP to evaluate if significant changes may have occurred since the Initial HoC report was prepared.

This Letter contains the results of Geosyntec's evaluation and documents significant changes that have occurred at the GMFP, AP1, and AP2 at DCPP, as they pertain the requirements of §257.73(c)(1)(i)-(xii)

UPDATES TO HISTORY OF CONSTRUCTION REPORT

Geosyntec's evaluation for the DCPP GMFP, AP1, and AP2 determined that no known significant changes requiring updates to the information in the Initial HoC report pertaining to §257.73(c)(1)(i)-(ii), §257.73(c)(1)(iv)-(vii), §257.73(c)(1)(ix), and §257.73(c)(1)(xi)-(xii) of the CCR Rule had occurred since the Initial HoC report was developed.

However, Geosyntec's evaluation determined that significant changes at the DCPP GMFP, AP1, and AP2 pertaining to §257.73(c)(1)(iii), §257.73(c)(1)(viii), §257.73(c)(1)(x) of the CCR Rule had occurred since the Initial HoC report had been developed. Additionally, information how long the CCR surface impoundments have been operating and the types of CCR in the surface impoundments, as required by Section 845.220(a)(1)(B) of the Part 845 Rule were not included in the Initial HoC report, as this information is not required by the CCR Rule. Each change and the subsequent updates to the Initial HoC report is described within this section.

Section 845.220(a)(1)(B): A statement of … how long the CCR surface impoundment has been in operation, and the types of CCR that have been placed in the surface impoundment.

GMF Pond

GMFP is in operation since 2009. As of the date of this report, the GMFP has been present for approximately 12 years.

CCR placed in the GMFP is being used to store and dispose of gypsum and to clarify recycled process water for plant operations [4].

Ash Pond No. 1

AP1 was in operation from 1976 until November 2015, for a total of approximately 39 years.

CCR placed in AP1 was used to store and dispose of fly ash and bottom ash [4].

Ash Pond No. 2

AP2 was in operation from 1986 until November 2015, for a total of approximately 35 years.

CCR placed in AP2 was used to store and dispose of fly ash and bottom ash and to clarify CCR contact stormwater prior to discharge.

§257.73(c)(1)(i): The name and address of the person(s) owning or operating the CCR unit; the name associated with the CCR unit; and the identification number of the CCR unit if one has been assigned by the state.

The state identification numbers (ID) for the GMFP, AP1 and AP2 have been assigned by the Illinois Environmental Protection Agency (IEPA). The IDs are listed in **Table 1**.

Table 1 – IEPA ID Numbers

CCR Surface Impoundment		State ID
Ash Pond No. 1		W0578010001-01
Ash Pond No. 2		W0578010001-02
GMF Pond		W0578010001-04

§ 257.73(c)(1)(iii): A statement of the purpose for which the CCR unit is being used.

AP1 and AP2 were closed in 2021, in substantial compliance with the written closure plans posted to IPRG's CCR Website ([5], [6]), and as documented by a certified Notification of Completion of Closure posted to IPRG's CCR Website [7]. Therefore, AP1 and AP2 are no longer capable of storing CCR or free liquids.

The DCPP was retired in December of 2019, with the generation of electricity ceased at that time. Therefore, the GMFP is no longer being used to storge and disposed of gypsum or to clarify recycled process water for use in plant operations, as gypsum is no longer being generated and process water is no longer required by the DCPP.

§ 257.73(c)(1)(viii): A description of the type, purpose, and location of existing instrumentation.

Instrumentation monitoring at AP1 and AP2 is no longer required as both CCR surface impoundments were closed in accordance with §257.102 [7], and the instrumentation

network was modified at that time. Therefore, the instrumentation locations shown in Appendix C of the Initial HoC report are no longer applicable to AP1 and AP2.

§ 257.73(c)(1)(x): A description of each spillway and diversion design features and capacities and calculations used in their determination.

AP1 and AP2 no longer retain free water as both CCR surface impoundments were closed in 2021 [7]. Therefore, spillways are no longer present the information regarding the spillways of these structures, as presented in the Initial HoC report, is no longer applicable to AP1 and AP2.

CLOSING

This letter has been prepared to document Geosyntec's evaluation of changes that have occurred at the GMFP, AP1, and AP2 at the DCPP since the Initial HoC was developed, based on reasonably and readily available information provided by IPRG, observed by Geosyntec during the site visit, or generated by Geosyntec as part of subsequent calculations.

Sincerely,

Lucas P. Carr, P.E.
Senior Engineer

John Seymour, P.E.
Senior Principal

REFERENCES

[1] AECOM, "History of Construction, USEPA Final CCR Rule, 40 CFR § 257.73(c), Duck Creek Power Station, Canton, Illinois," October 2016.

[2] United Stated Environmental Protection Agency, "40 CFR Parts 257 and 261, Hazardous and Solid Waste Management System, Disposal of Coal Combustion Residuals from Electric Utilities, Final Rule, 2015," 2015.

[3] Illinois Environmental Protection Agency, "35 Ill. Adm. Code Part 845, Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments," Springfield, IL, 2021.

[4] AECOM, "History of Construction, USEPA Final CCR Rule, 40 CFR § 257.73(c), Hennepin Power Station, Hennepin, Illinois," October 2016.

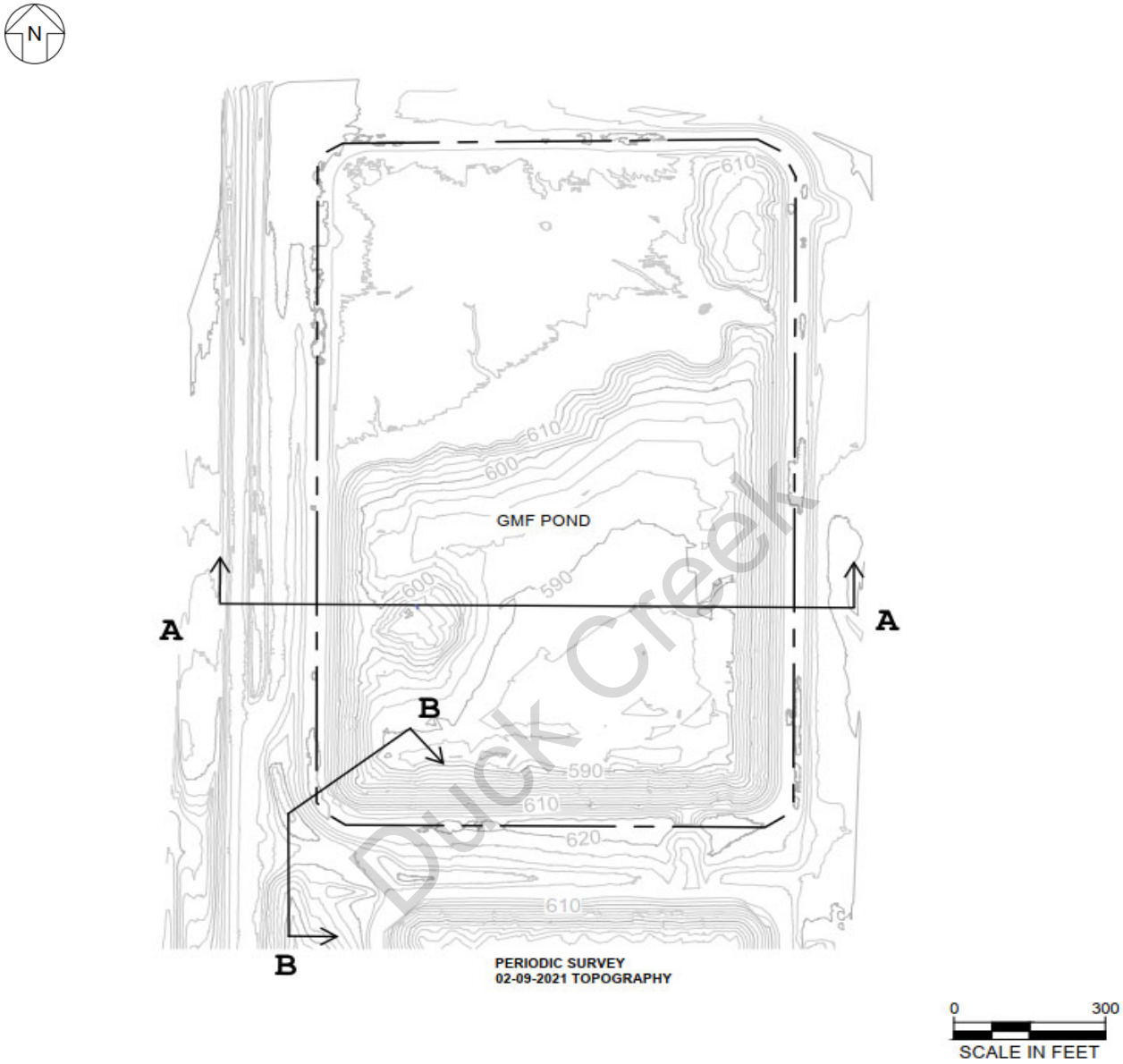
[5] V. Modeer, "Closure Plan for Existing CCR Sruface Impoundment, 40 CFR 257.102(b), Duck Creek Power Station, Illinois Power Resoruces Generation, LLC, Ash Pond No. 1," December 17, 2020.

[6] V. Modeer, "Closure Plan for Existing CCR Surface Impoundment, 40 CFR 257.102(b), Duck Creek Power Station, Illinois Power Resoruces Generating, LLC, Ash Pond No. 2," December 17, 2020.

[7] D. Tickner, "Duck Creek Power Station; Ash Pond No.1 and No. 2, Notificaiton of Completion of Closure," Luminant, Collinsville, Illinois, January 22, 2021.

Attachment D

Periodic Structural Stability and Safety Factor Assessment Analyses



NOTES:

1. The cross-sections are shown on the periodic topography of GMF Pond, prepared by IngenAE, dated February 9, 2021.
2. A-A is the cross-section used in the 2016 AECOM initial SFA & SSA and cross-section B-B is the 2021 Geosyntec updated periodic SFA.

CROSS-SECTION LOCATIONS
PERIODIC CERTIFICATION
DUCK CREEK POWER PLANT- GMF POND
FULTON, ILLINOIS

Geosyntec consultants

Figure D-1

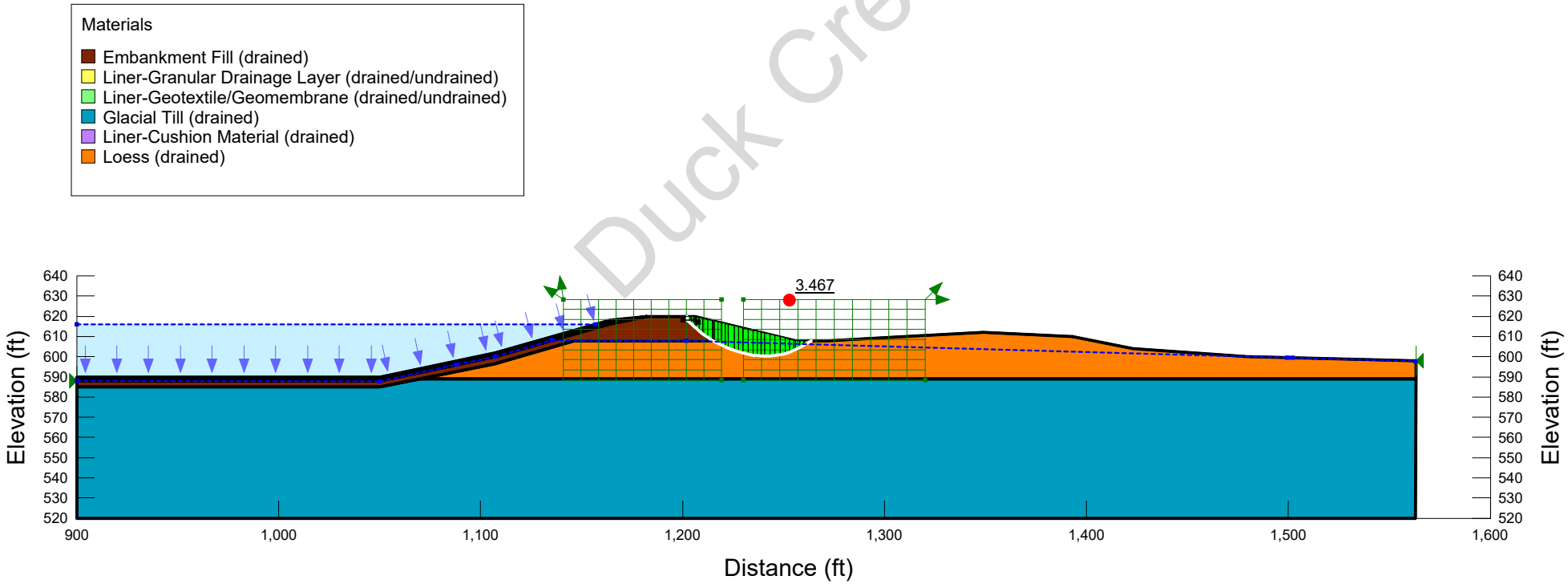
GLP8027 | 8/25/2021

Dynegy CCR Program - Duck Creek Power Plant
GMF Pond Section B-B
Canton, Illinois

Drawn by: PK Date: 8/25/2021
Checked by: LPC Date: 8/25/2021

Name: Static, Long-Term, Block Failure Surface

Name: Embankment Fill (drained) Unit Weight: 116 pcf Cohesion': 150 psf Phi': 32 °
Name: Liner-Granular Drainage Layer (drained/undrained) Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Liner-Geotextile/Geomembrane (drained/undrained) Unit Weight: 75 pcf Cohesion': 100 psf Phi': 25 °
Name: Glacial Till (drained) Unit Weight: 125 pcf Cohesion': 200 psf Phi': 30 °
Name: Liner-Cushion Material (drained) Unit Weight: 116 pcf Cohesion': 0 psf Phi': 38 °
Name: Loess (drained) Unit Weight: 116 pcf Cohesion': 100 psf Phi': 32 °



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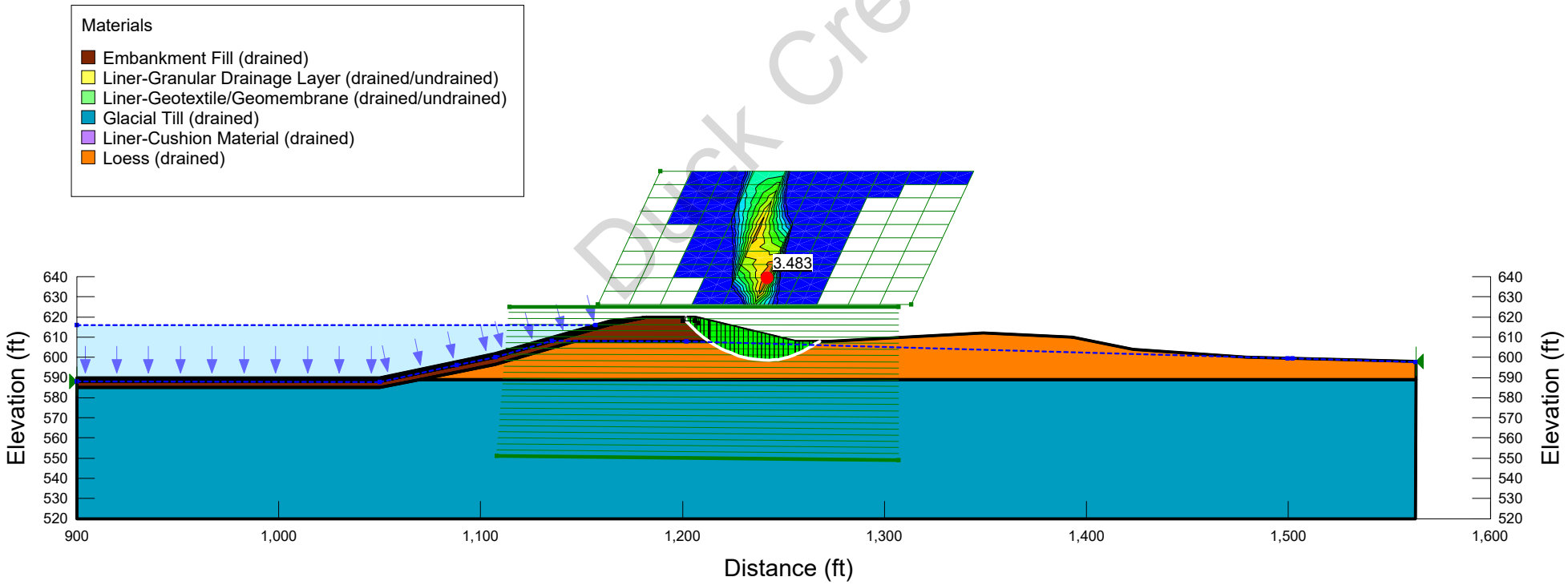
Dynegy CCR Program - Duck Creek Power Plant
GMF Pond Section B-B
Canton, Illinois

Drawn by: PK Date: 8/25/2021
Checked by: LPC Date: 8/25/2021

Name: Static, Long-Term, Circular Failure Surface

Name: Embankment Fill (drained) Unit Weight: 116 pcf Cohesion': 150 psf Phi': 32 °
Name: Liner-Granular Drainage Layer (drained/undrained) Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Liner-Geotextile/Geomembrane (drained/undrained) Unit Weight: 75 pcf Cohesion': 100 psf Phi': 25 °
Name: Glacial Till (drained) Unit Weight: 125 pcf Cohesion': 200 psf Phi': 30 °
Name: Liner-Cushion Material (drained) Unit Weight: 116 pcf Cohesion': 0 psf Phi': 38 °
Name: Loess (drained) Unit Weight: 116 pcf Cohesion': 100 psf Phi': 32 °



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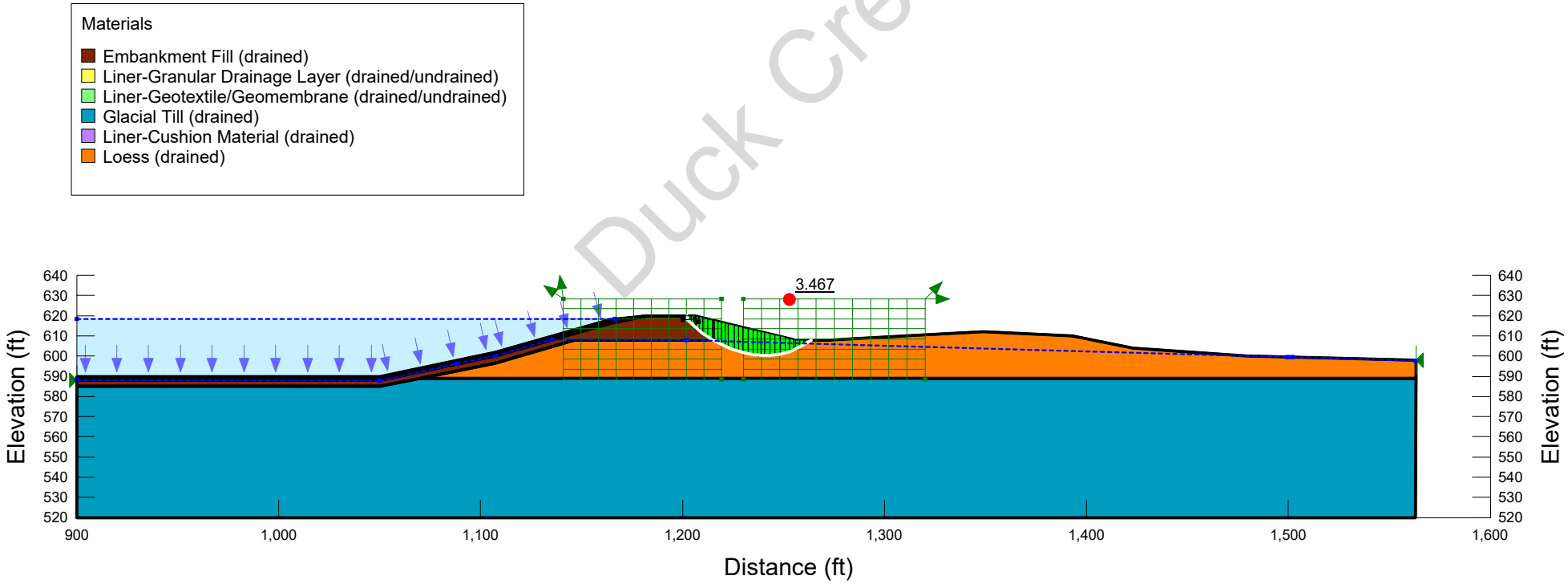
Dynegy CCR Program - Duck Creek Power Plant
GMF Pond Section B-B
Canton, Illinois

Drawn by: PK Date: 8/25/2021
Checked by: LPC Date: 8/25/2021

Name: Static, Surchage Pool, Block Failure Surface

Name: Embankment Fill (drained) Unit Weight: 116 pcf Cohesion': 150 psf Phi': 32 °
Name: Liner-Granular Drainage Layer (drained/undrained) Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Liner-Geotextile/Geomembrane (drained/undrained) Unit Weight: 75 pcf Cohesion': 100 psf Phi': 25 °
Name: Glacial Till (drained) Unit Weight: 125 pcf Cohesion': 200 psf Phi': 30 °
Name: Liner-Cushion Material (drained) Unit Weight: 116 pcf Cohesion': 0 psf Phi': 38 °
Name: Loess (drained) Unit Weight: 116 pcf Cohesion': 100 psf Phi': 32 °



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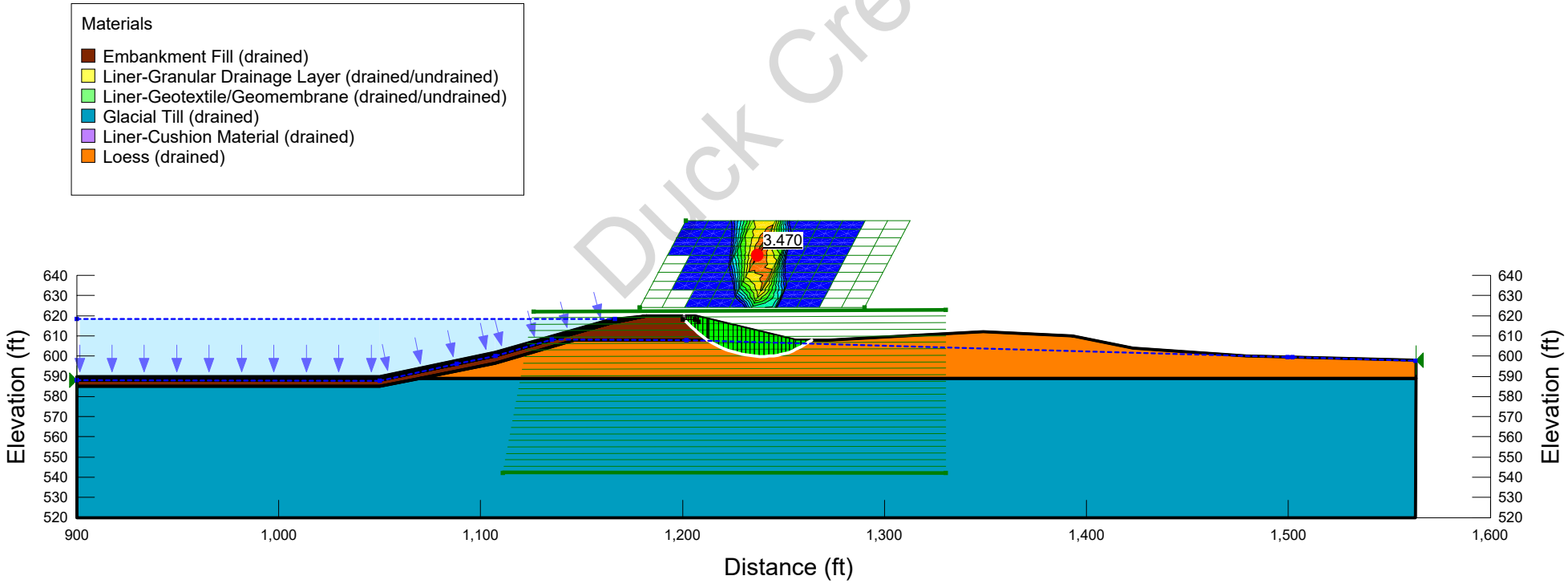
Dynegy CCR Program - Duck Creek Power Plant
GMF Pond Section B-B
Canton, Illinois

Drawn by: PK Date: 8/25/2021
Checked by: LPC Date: 8/25/2021

Name: Static, Surcharge Pool, Circular Failure Surface

Name: Embankment Fill (drained) Unit Weight: 116 pcf Cohesion': 150 psf Phi': 32 °
Name: Liner-Granular Drainage Layer (drained/undrained) Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Liner-Geotextile/Geomembrane (drained/undrained) Unit Weight: 75 pcf Cohesion': 100 psf Phi': 25 °
Name: Glacial Till (drained) Unit Weight: 125 pcf Cohesion': 200 psf Phi': 30 °
Name: Liner-Cushion Material (drained) Unit Weight: 116 pcf Cohesion': 0 psf Phi': 38 °
Name: Loess (drained) Unit Weight: 116 pcf Cohesion': 100 psf Phi': 32 °



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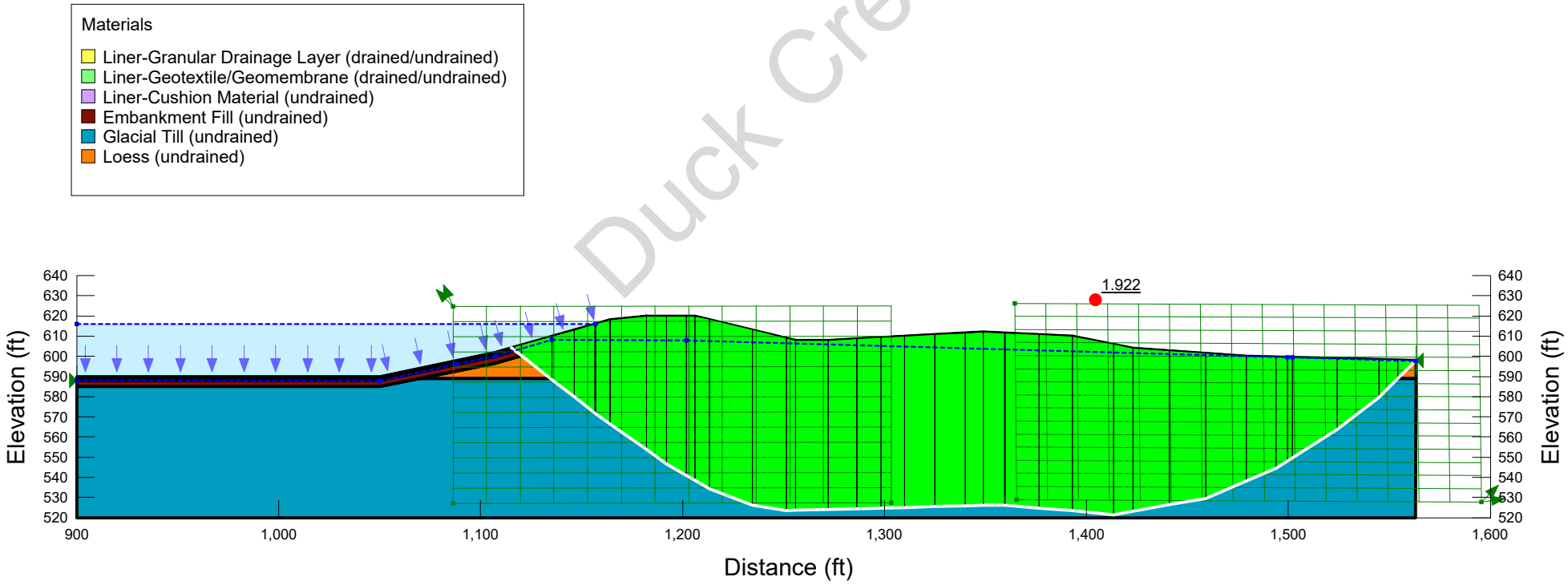
Dynegy CCR Program - Duck Creek Power Plant
GMF Pond Section B-B
Canton, Illinois

Drawn by: PK Date: 8/25/2021
Checked by: LPC Date: 8/25/2021

Name: Seismic, Block Failure Surface

Name: Liner-Granular Drainage Layer (drained/undrained) Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Liner-Geotextile/Geomembrane (drained/undrained) Unit Weight: 75 pcf Cohesion': 100 psf Phi': 25 °
Name: Liner-Cushion Material (undrained) Unit Weight: 116 pcf Cohesion': 660 psf Phi': 0 °
Name: Embankment Fill (undrained) Unit Weight: 116 pcf Cohesion': 2,150 psf Phi': 0 °
Name: Glacial Till (undrained) Unit Weight: 125 pcf Cohesion': 1,900 psf Phi': 0 °
Name: Loess (undrained) Unit Weight: 116 pcf Cohesion': 1,250 psf Phi': 0 °

Horz Seismic Coef.: 0.116 g



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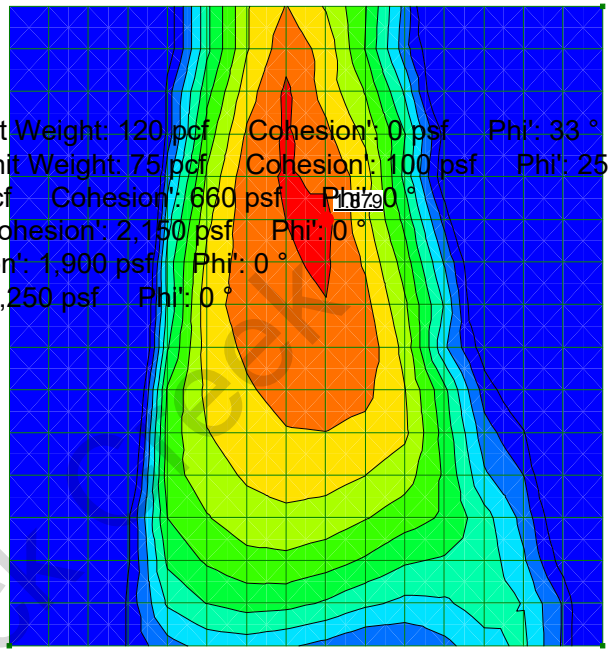
Dynegy CCR Program - Duck Creek Power Plant
GMF Pond Section B-B
Canton, Illinois

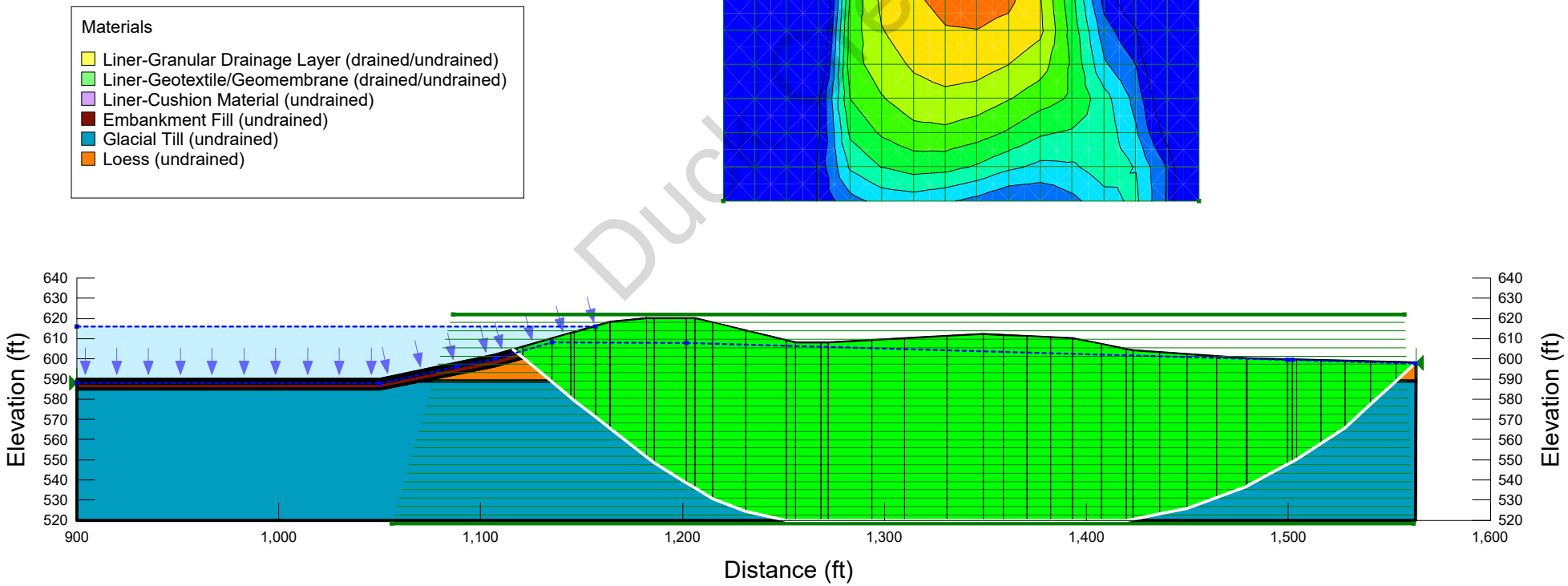
Drawn by: PK Date: 8/25/2021
Checked by: LPC Date: 8/25/2021

Name: Seismic, Circular Failure Surface

Name: Liner-Granular Drainage Layer (drained/undrained) Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Liner-Geotextile/Geomembrane (drained/undrained) Unit Weight: 75 pcf Cohesion': 100 psf Phi': 25 °
Name: Liner-Cushion Material (undrained) Unit Weight: 116 pcf Cohesion': 660 psf Phi': 0 °
Name: Embankment Fill (undrained) Unit Weight: 116 pcf Cohesion': 2,150 psf Phi': 0 °
Name: Glacial Till (undrained) Unit Weight: 125 pcf Cohesion': 1,900 psf Phi': 0 °
Name: Loess (undrained) Unit Weight: 116 pcf Cohesion': 1,250 psf Phi': 0 °

Horz Seismic Coef.: 0.116 g





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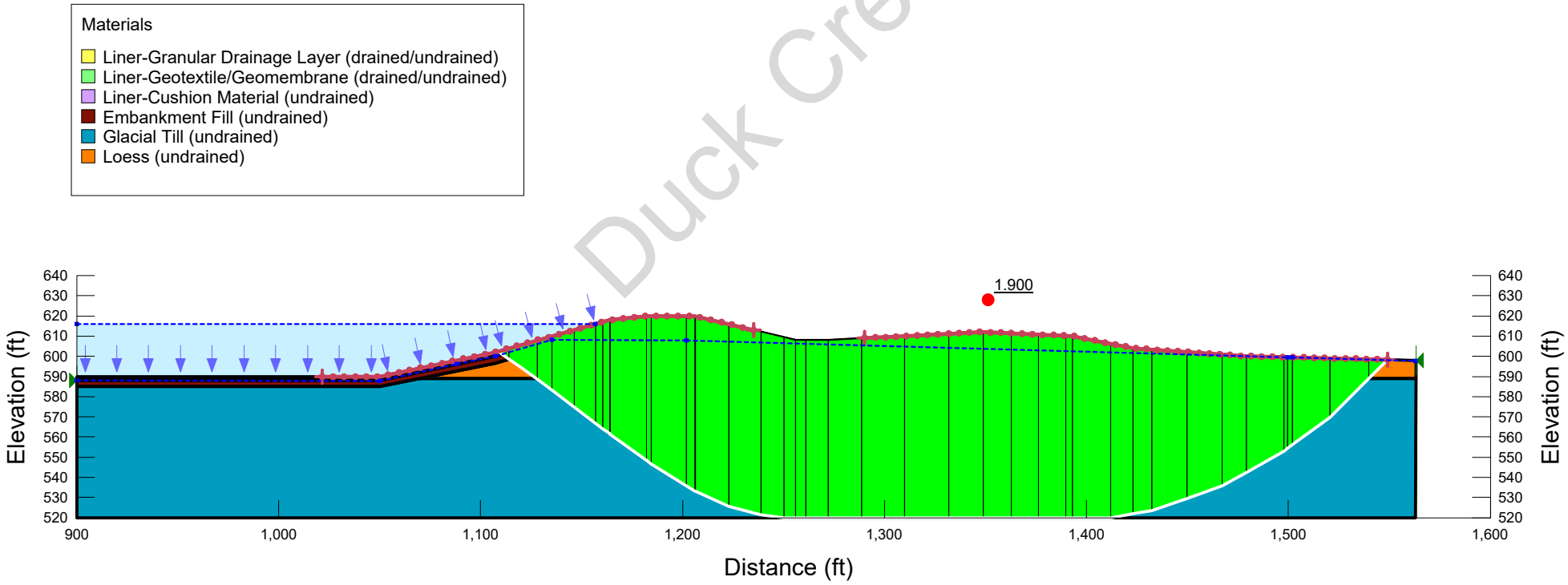
Dynegy CCR Program - Duck Creek Power Plant
GMF Pond Section B-B
Canton, Illinois

Drawn by: PK Date: 8/25/2021
Checked by: LPC Date: 8/25/2021

Name: Seismic, Entry-Exit Failure Surface

Name: Liner-Granular Drainage Layer (drained/undrained) Unit Weight: 120 pcf Cohesion': 0 psf Phi': 33 °
Name: Liner-Geotextile/Geomembrane (drained/undrained) Unit Weight: 75 pcf Cohesion': 100 psf Phi': 25 °
Name: Liner-Cushion Material (undrained) Unit Weight: 116 pcf Cohesion': 660 psf Phi': 0 °
Name: Embankment Fill (undrained) Unit Weight: 116 pcf Cohesion': 2,150 psf Phi': 0 °
Name: Glacial Till (undrained) Unit Weight: 125 pcf Cohesion': 1,900 psf Phi': 0 °
Name: Loess (undrained) Unit Weight: 116 pcf Cohesion': 1,250 psf Phi': 0 °

Horz Seismic Coef.: 0.116 g



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